NTC Thermistors, Radial Leaded, Standard Precision



QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Resistance value at 25 °C	3.3 to 470K	Ω
Tolerance on R_{25}-value	± 2; ± 3; ± 5	%
$B_{25/85}$-value	2880 to 4570	K
Tolerance on $B_{25/85}$-value	± 0.5 to ± 3	%
Operating temperature range: At zero power dissipation; continuously At zero power dissipation; for short periods	-40 to +125 ≤ 150	°C
Response time (in oil)	≈ 1.2	s
Thermal time constant τ (for information only)	15	s
Dissipation factor δ (for information only)	7 8.5 (for R_{25}-value ≤ 680 Ω)	mW/K
Maximum power dissipation at 55 °C	500	mW
Climatic category (LCT / UCT / days)	40 / 125 / 56	-
Weight	≈ 0.3	g

FEATURES





- Accuracy over a wide temperature range
- High stability over a long life
- Excellent price/performance ratio
- RoHS compliant, available with or without exemption
- UL recognized, file E148885
- Mounting: radial
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Temperature measurement, compensation, sensing and control in consumer and industrial applications

DESCRIPTION

These thermistors have a negative temperature coefficient. The part consists of a NTC chip, soldered between two tin plated copper wires. It has a gray base coating and is color band coded. The coating has no specified insulation properties.

PACKAGING

The thermistors are packed in bulk or tape on reel; see part numbers and relevant packaging quantities.

DESIGN-IN SUPPORT

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

MARKING

The thermistors are marked with colored bands; see dimensions drawing and “Electrical data and ordering information”.

MOUNTING

By soldering in any position.
Not intended for potted applications.

ELECTRICAL DATA AND ORDERING INFORMATION

R_{25} (Ω)	R_{25}-TOL. (± %)	$B_{25/85}$ (K)	$B_{25/85}$-TOL. (± %)	UL RECOGNIZED (Y/N)	SAP MATERIAL NUMBER NTCLE100E3....B0/T1/T2 RoHS COMPLIANT WITH EXEMPTIONS (1)	SAP MATERIAL NUMBER NTCLE100E3....B0A/T1A/T2A RoHS COMPLIANT WITHOUT EXEMPTIONS (1)	COLOR CODE (2) I	II	III
3.3	2, 3, 5	2880	3	N	338*B0	338*B0A	Orange	Orange	Gold
4.7	2, 3, 5	2880	3	N	478*B0	478*B0A	Yellow	Violet	Gold
6.8	2, 3, 5	2880	3	N	688*B0	688*B0A	Blue	Grey	Gold
10	2, 3, 5	2990	3	N	109*B0	109*B0A	Brown	Black	Black
15	2, 3, 5	3041	3	N	159*B0	159*B0A	Brown	Green	Black
22	2, 3, 5	3136	3	N	229*B0	229*B0A	Red	Red	Black
33	2, 3, 5	3390	3	Y	339*B0	339*B0A	Orange	Orange	Black
47	2, 3, 5	3390	3	Y	479*B0	479*B0A	Yellow	Violet	Black
68	2, 3, 5	3390	3	Y	689*B0	689*B0A	Blue	Grey	Black
100	2, 3, 5	3560	1.5	Y	101*B0	101*B0A	Brown	Black	Brown
150	2, 3, 5	3560	1.5	Y	151*B0	151*B0A	Brown	Green	Brown
220	2, 3, 5	3560	1.5	Y	221*B0	221*B0A	Red	Red	Brown

ELECTRICAL DATA AND ORDERING INFORMATION

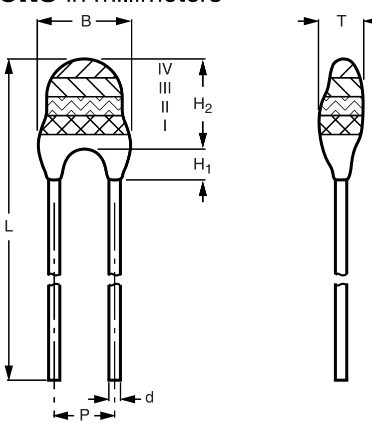
R_{25} (Ω)	R_{25}-TOL. (± %)	$B_{25/85}$ (K)	$B_{25/85}$-TOL. (± %)	UL RECOGNIZED (Y/N)	SAP MATERIAL NUMBER NTCLE100E3....B0/T1/T2 RoHS COMPLIANT WITH EXEMPTIONS (1)	SAP MATERIAL NUMBER NTCLE100E3....B0A/T1A/T2A RoHS COMPLIANT WITHOUT EXEMPTIONS (1)	COLOR CODE (2)		
							I	II	III
330	2, 3, 5	3560	1.5	Y	331*B0	331*B0A	Orange	Orange	Brown
470	2, 3, 5	3560	1.5	Y	471*B0	471*B0A	Yellow	Violet	Brown
680	2, 3, 5	3560	1.5	Y	681*B0	681*B0A	Blue	Grey	Brown
1000	2, 3, 5	3528	0.5	Y	102*B0	102*B0A	Brown	Black	Red
1500	2, 3, 5	3528	0.5	Y	152*B0	152*B0A	Brown	Green	Red
2000	2, 3, 5	3528	0.5	Y	202*B0	202*B0A	Red	Black	Red
2200	2, 3, 5	3977	0.75	Y	222*B0	222*B0A	Red	Red	Red
2700	2, 3, 5	3977	0.75	Y	272*B0	272*B0A	Red	violet	Red
3300	2, 3, 5	3977	0.75	Y	332*B0	332*B0A	Orange	Orange	Red
4700	2, 3, 5	3977	0.75	Y	472*B0	472*B0A	Yellow	Violet	Red
5000	2, 3, 5	3977	0.75	Y	502*B0	502*B0A	Green	Black	Red
6800	2, 3, 5	3977	0.75	Y	682*B0	682*B0A	Blue	Grey	Red
10 000	2, 3, 5	3977	0.75	Y	103*B0	103*B0A	Brown	Black	Orange
12 000	2, 3, 5	3740	2	Y	123*B0	123*B0A	Brown	Red	Orange
15 000	2, 3, 5	3740	2	Y	153*B0	153*B0A	Brown	Green	Orange
22 000	2, 3, 5	3740	2	Y	223*B0	223*B0A	Red	Red	Orange
33 000	2, 3, 5	4090	1.5	Y	333*B0	333*B0A	Orange	Orange	Orange
47 000	2, 3, 5	4090	1.5	Y	473*B0	473*B0A	Yellow	Violet	Orange
50 000	2, 3, 5	4190	1.5	Y	503*B0	503*B0A	Green	Black	Orange
68 000	2, 3, 5	4190	1.5	Y	683*B0	683*B0A	Blue	Grey	Orange
100 000	2, 3, 5	4190	1.5	Y	104*B0	104*B0A	Brown	Black	Yellow
150 000	2, 3, 5	4370	2.5	Y	154*B0	154*B0A	Brown	Green	Yellow
220 000	2, 3, 5	4370	2.5	Y	224*B0	224*B0A	Red	Red	Yellow
330 000	2, 3, 5	4570	1.5	N	334*B0	334*B0A	Orange	Orange	Yellow
470 000	2, 3, 5	4570	1.5	N	474*B0	474*B0A	Yellow	Violet	Yellow

Notes

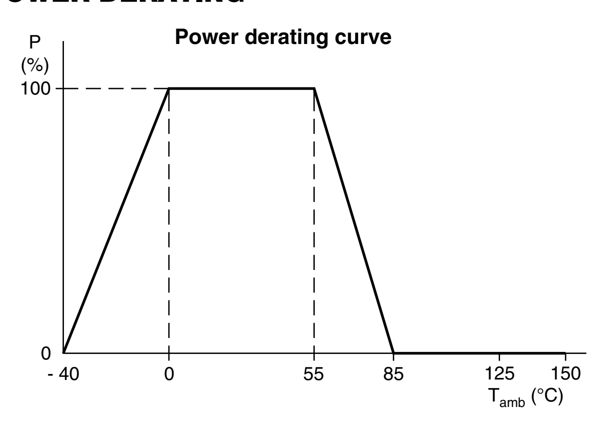
(1) Replace * in SAP by J for 5 %, H for 3 %, G for 2 %.

(2) For R_{25} ± 2 % band IV is red, ± 3 % band IV is orange, ± 5 % band IV is gold.

DIMENSIONS in millimeters



POWER DERATING



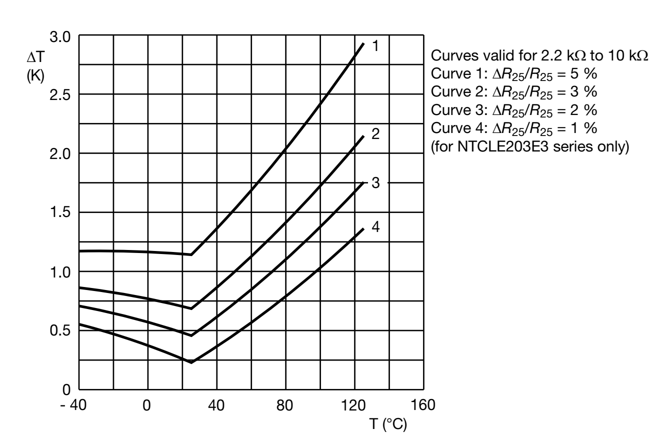
Note

- Zero power is considered as measuring power max. 1 % of max. power. Voltage on the NTC should always be below 50 V_{DC}.

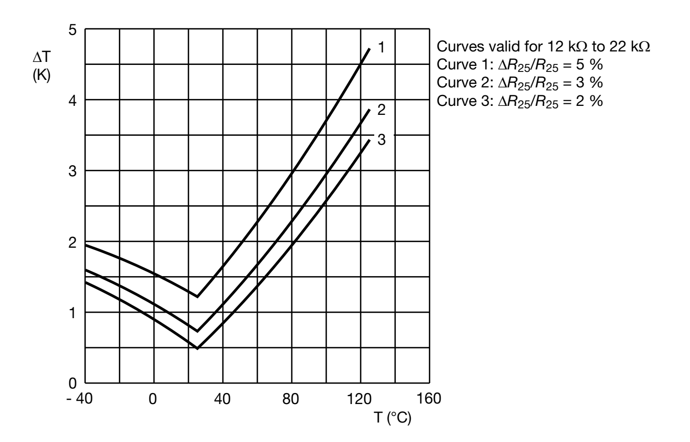
PHYSICAL DIMENSIONS FOR RELEVANT TYPE (all dimensions in millimeters)

R_{25}-VALUE	$B_{MAX.}$	d	H_1		$H_{2\ MAX.}$	L	P	$T_{MAX.}$
			MIN.	MAX.				
3.3 Ω to 220 Ω	5.0	0.6 ± 0.06	1.0	4.0	6.0	24 ± 1.5	2.54	4.0
330 Ω to 470 kΩ	3.3 ± 0.5	0.6 ± 0.06	1.0	3.0	6.0	24 ± 1.5	2.54	3.0

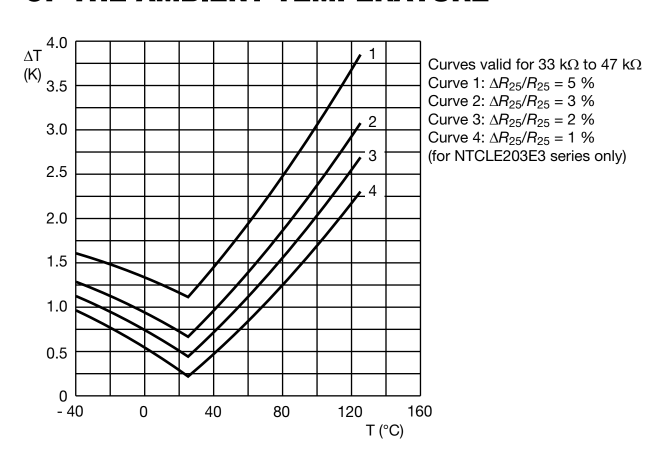
TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



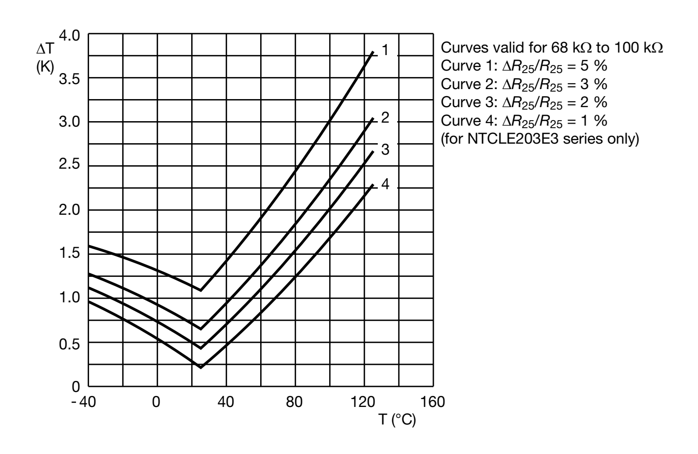
TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



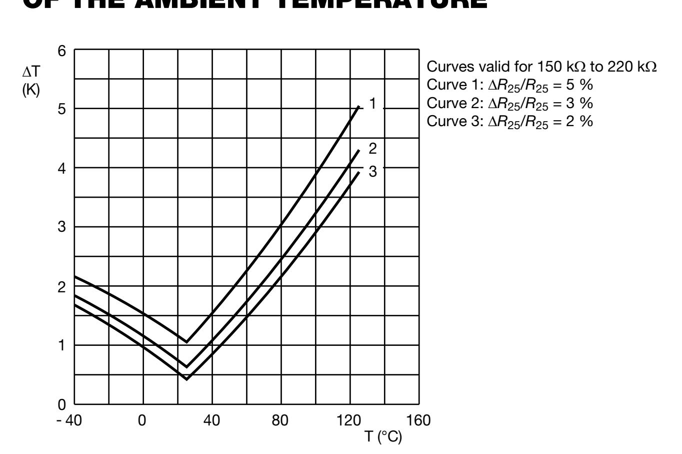
TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



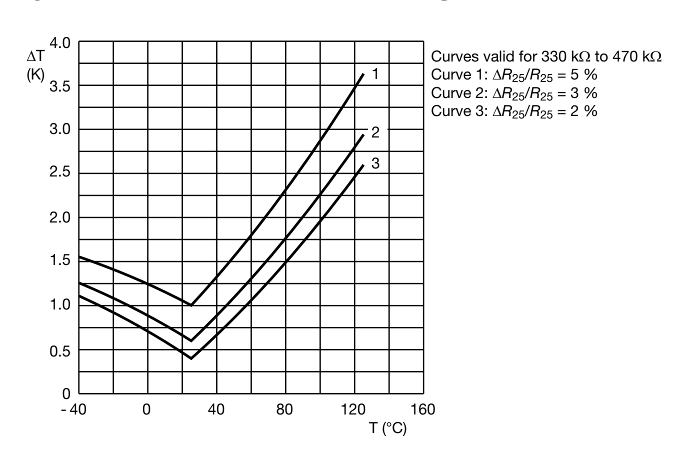
TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



TEMPERATURE DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



R_T VALUE AND TOLERANCE

These thermistors have a narrow tolerance on the B-value, the result of which provides a very small tolerance on the nominal resistance value over a wide temperature range. For this reason the usual graphs of $R = f(T)$ are replaced by Resistance Values at Intermediate Temperatures Tables, together with a formula to calculate the characteristics with a high precision.

FORMULAE TO DETERMINE NOMINAL RESISTANCE VALUES

The resistance values at intermediate temperatures, or the operating temperature values, can be calculated using the following interpolation laws (extended *"Steinhart and Hart"*):

$$R_{(T)} = R_{ref} \times e^{(A + B/T + C/T^2 + D/T^3)} \quad (1)$$

$$T_{(R)} = \left(A_1 + B_1 \ln\frac{R}{R_{ref}} + C_1 \ln^2\frac{R}{R_{ref}} + D_1 \ln^3\frac{R}{R_{ref}}\right)^{-1} \quad (2)$$

where:

A, B, C, D, A_1, B_1, C_1 and D_1 are constant values depending on the material concerned; see table below.

$R_{ref.}$ is the resistance value at a reference temperature (in this event 25 °C, $R_{ref.} = R_{25}$).

T is the temperature in K.

Formulae numbered and are interchangeable with an error of max. 0.005 °C in the range 25 °C to 125 °C and max. 0.015 °C in the range - 40 °C to + 25 °C.

DETERMINATION OF THE RESISTANCE/TEMPERATURE DEVIATION FROM NOMINAL VALUE

The total resistance deviation is obtained by combining the "R_{25}-tolerance" and the "resistance deviation due to B-tolerance".

When:

X = R_{25}-tolerance

Y = resistance deviation due to B-tolerance

Z = complete resistance deviation,

then: $Z = \left[\left(1 + \frac{X}{100}\right) \times \left(1 + \frac{Y}{100}\right) - 1\right] \times 100\ \%$ or $Z \approx X + Y$

When:

TCR = temperature coefficient

ΔT = temperature deviation,

then: $\Delta T = \frac{Z}{TCR}$

The temperature tolerances are plotted in the graphs on the previous page.

Example: at 0 °C, assume X = 5 %, Y = 0.89 % and TCR = 5.08 %/K (see table), then:

$$Z = \left\{\left[1 + \frac{5}{100}\right] \times \left[1 + \frac{0.89}{100}\right] - 1\right\} \times 100\%$$

$$= \{1.05 \times 1.0089 - 1\} \times 100\ \% = 5.9345\ \% (\approx 5.93\ \%)$$

$$\Delta T = \frac{Z}{TCR} = \frac{5.93}{5.08} = 1.167\ °C\ (\approx 1.17\ °C)$$

A NTC with a R_{25}-value of 10 kΩ has a value of 32.56 kΩ between - 1.17 °C and + 1.17 °C.

PARAMETER FOR DETERMINING NOMINAL RESISTANCE VALUES

NUMBER	$B_{25/85}$ (K)	NAME	TOL. B (%)	A	B (K)	C (K^2)	D (K^3)	A_1	B_1 (K^{-1})	C_1 (K^{-2})	D_1 (K^{-3})
1	2880	Mat O. with Bn = 2880K	3	- 9.094	2251.74	229098	- 2.744820E+07	3.354016E-03	3.495020E-04	2.095959E-06	4.260615E-07
2	2990	Mat P. with Bn = 3990K	3	- 10.2296	2887.62	132336	- 2.502510E+07	3.354016E-03	3.415560E-04	4.955455E-06	4.364236E-07
3	3041	Mat Q. with Bn = 3041K	3	- 11.1334	3658.73	- 102895	5.166520E+05	3.354016E-03	3.349290E-04	3.683843E-06	7.050455E-07
4	3136	Mat R. with Bn = 3136K	3	- 12.4493	4702.74	- 402687	3.196830E+07	3.354016E-03	3.243880E-04	2.658012E-06	- 2.701560E-07
5	3390	Mat S. with Bn = 3390K	3	- 12.6814	4391.97	- 232807	1.509643E+07	3.354016E-03	2.993410E-04	2.135133E-06	- 5.672000E-09
6	3528 (1)	Mat I. with Bn = 3528K	0.5	- 12.0596	3687.667	- 7617.13	- 5.914730E+06	3.354016E-03	2.909670E-04	1.632136E-06	7.192200E-08
	3528 (2)			- 21.0704	11903.95	- 2504699	2.470338E+08	3.354016E-03	2.933908E-04	3.494314E-06	- 7.712690E-07
7	3560	Mat H. with Bn = 3560K	1.5	- 13.0723	4190.574	- 47158.4	- 1.199256E+07	3.354016E-03	2.884193E-04	4.118032E-06	1.786790E-07
8	3740	Mat B. with Bn = 3740K	2	- 13.8973	4557.725	- 98275	- 7.522357E+06	3.354016E-03	2.744032E-04	3.666944E-06	1.375492E-07
9	3977	Mat A. with Bn =3977K	0.75	- 14.6337	4791.842	- 115334	- 3.730535E+06	3.354016E-03	2.569850E-04	2.620131E-06	6.383091E-08
10	4090	Mat C. with Bn = 4090K	1.5	- 15.5322	5229.973	- 160451	- 5.414091E+06	3.354016E-03	2.519107E-04	3.510939E-06	1.105179E-07
11	4190	Mat D. with Bn = 4190K	1.5	- 16.0349	5459.339	- 191141	- 3.328322E+06	3.354016E-03	2.460382E-04	3.405377E-06	1.034240E-07
12	4370	Mat E. with Bn = 4370K	2.5	- 16.8717	5759.15	- 194267	- 6.869149E+06	3.354016E-03	2.367720E-04	3.585140E-06	1.255349E-07
13	4570	Mat F. with Bn = 4570K	1.5	- 17.6439	6022.726	- 203157	- 7.183526E+06	3.354016E-03	2.264097E-04	3.278184E-06	1.097628E-07

Notes

(1) Temperature < 25 °C

(2) Temperature ≥ 25 °C

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (3.3, 4.7, 6.8) Ω					
T_{OPER} (°C)	PART NUMBER NTCLE100E3338***	PART NUMBER NTCLE100E3478***	PART NUMBER NTCLE100E3688***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
	R_T (Ω)	R_T (Ω)	R_T (Ω)		
-40	45.00	64.09	92.73	-4.97	8.08
-35	35.25	50.20	72.63	-4.80	7.30
-30	27.84	39.64	57.36	-4.64	6.55
-25	22.16	31.56	45.66	-4.48	5.84
-20	17.78	25.32	36.63	-4.33	5.15
-15	14.37	20.46	29.60	-4.19	4.49
-10	11.69	16.65	24.09	-4.05	3.85
-5	9.582	13.65	19.74	-3.92	3.24
0	7.904	11.26	16.29	-3.79	2.65
5	6.560	9.344	13.52	-3.66	2.08
10	5.479	7.803	11.29	-3.55	1.54
15	4.602	6.554	9.482	-3.43	1.01
20	3.886	5.535	8.008	-3.32	0.49
25	3.300	4.700	6.800	-3.22	0.00
30	2.816	4.011	5.803	-3.12	0.48
35	2.415	3.440	4.977	-3.02	0.94
40	2.081	2.964	4.289	-2.93	1.39
45	1.801	2.566	3.712	-2.84	1.82
50	1.566	2.230	3.227	-2.76	2.24
55	1.367	1.947	2.817	-2.68	2.65
60	1.198	1.706	2.469	-2.60	3.04
65	1.054	1.501	2.172	-2.52	3.43
70	0.9308	1.326	1.918	-2.45	3.80
75	0.8248	1.175	1.700	-2.38	4.16
80	0.7334	1.044	1.511	-2.32	4.51
85	0.6542	0.9318	1.348	-2.25	4.85
90	0.5854	0.8338	1.206	-2.19	5.19
95	0.5255	0.7484	1.083	-2.13	5.51
100	0.4730	0.6737	0.9748	-2.07	5.82
105	0.4270	0.6082	0.8799	-2.02	6.13
110	0.3865	0.5505	0.7965	-1.97	6.43
115	0.3508	0.4996	0.7228	-1.92	6.72
120	0.3192	0.4545	0.6576	-1.87	7.00
125	0.2911	0.4145	0.5998	-1.82	7.28
130	0.2661	0.3789	0.5483	-1.77	7.55
135	0.2438	0.3472	0.5023	-1.73	7.81
140	0.2238	0.3188	0.4612	-1.69	8.07
145	0.2059	0.2933	0.4244	-1.65	8.32
150	0.1899	0.2704	0.3912	-1.61	8.56

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (10, 15, 22) Ω									
T_{OPER} (°C)	PART NUMBER NTCLE100E3109***			PART NUMBER NTCLE100E3159***			PART NUMBER NTCLE100E3229***		
	R_T (Ω)	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)	R_T (Ω)	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)	R_T (Ω)	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
-40	136.7	-4.86	8.39	224.8	-5.16	8.65	374.9	-5.54	8.80
-35	107.6	-4.72	7.58	174.5	-4.98	7.79	285.8	-5.31	7.95
-30	85.32	-4.58	6.81	136.6	-4.80	6.98	220.4	-5.10	7.14
-25	68.10	-4.44	6.06	107.9	-4.64	6.21	171.7	-4.90	6.36
-20	54.72	-4.31	5.35	85.94	-4.48	5.47	135.0	-4.71	5.61
-15	44.25	-4.18	4.66	68.96	-4.33	4.76	107.2	-4.53	4.89
-10	36.02	-4.06	4.00	55.74	-4.19	4.08	85.79	-4.37	4.20
-5	29.49	-3.94	3.37	45.37	-4.05	3.43	69.21	-4.22	3.53
0	24.30	-3.82	2.75	37.17	-3.92	2.81	56.26	-4.07	2.89
5	20.13	-3.71	2.16	30.65	-3.80	2.20	46.05	-3.94	2.27
10	16.77	-3.60	1.59	25.42	-3.68	1.62	37.94	-3.81	1.67
15	14.04	-3.50	1.04	21.21	-3.57	1.06	31.45	-3.69	1.10
20	11.82	-3.39	0.51	17.79	-3.46	0.52	26.23	-3.57	0.54
25	10.00	-3.30	0.00	15.00	-3.36	0.00	22.00	-3.47	0.00
30	8.500	-3.20	0.50	12.76	-3.26	0.49	18.55	-3.36	0.52
35	7.259	-3.11	0.98	10.86	-3.17	0.98	15.72	-3.26	1.02
40	6.226	-3.03	1.44	9.291	-3.08	1.46	13.38	-3.17	1.51
45	5.363	-2.94	1.89	7.982	-2.99	1.92	11.45	-3.08	1.98
50	4.639	-2.86	2.33	6.887	-2.91	2.36	9.833	-3.00	2.44
55	4.029	-2.78	2.75	5.966	-2.83	2.79	8.482	-2.92	2.88
60	3.512	-2.71	3.16	5.189	-2.75	3.21	7.346	-2.84	3.32
65	3.073	-2.64	3.56	4.529	-2.68	3.62	6.386	-2.76	3.73
70	2.698	-2.57	3.95	3.968	-2.61	4.02	5.572	-2.69	4.14
75	2.377	-2.50	4.32	3.488	-2.54	4.41	4.879	-2.62	4.53
80	2.101	-2.43	4.69	3.077	-2.48	4.78	4.286	-2.56	4.91
85	1.864	-2.37	5.04	2.722	-2.41	5.15	3.777	-2.50	5.29
90	1.658	-2.31	5.38	2.416	-2.35	5.51	3.339	-2.44	5.65
95	1.479	-2.25	5.72	2.151	-2.30	5.85	2.960	-2.38	6.00
100	1.323	-2.20	6.05	1.920	-2.24	6.19	2.632	-2.32	6.34
105	1.187	-2.14	6.36	1.719	-2.19	6.53	2.347	-2.27	6.68
110	1.068	-2.09	6.67	1.543	-2.13	6.85	2.098	-2.22	7.00
115	0.9635	-2.04	6.98	1.389	-2.08	7.17	1.880	-2.17	7.32
120	0.8712	-1.99	7.27	1.253	-2.03	7.48	1.689	-2.12	7.62
125	0.7897	-1.94	7.56	1.133	-1.99	7.78	1.521	-2.07	7.93
130	0.7174	-1.90	7.84	1.027	-1.94	8.08	1.373	-2.03	8.22
135	0.6533	-1.85	8.11	0.9326	-1.90	8.37	1.242	-1.98	8.50
140	0.5961	-1.81	8.37	0.8490	-1.86	8.65	1.126	-1.94	8.78
145	0.5451	-1.77	8.63	0.7744	-1.82	8.93	1.023	-1.90	9.06
150	0.4995	-1.73	8.89	0.7079	-1.78	9.20	0.9309	-1.86	9.32

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (33, 47, 68) Ω					
T_{OPER} (°C)	PART NUMBER NTCLE100E3339***	PART NUMBER NTCLE100E3479***	PART NUMBER NTCLE100E3689***	TCR (%/K)	$\Delta R/R$ DUE TO $B_{tol.}$ (%)
	R_T (Ω)	R_T (Ω)	R_T (Ω)		
-40	707.0	1007	1457	-5.94	9.30
-35	528.5	752.7	1089	-5.70	8.44
-30	399.5	569.0	823.3	-5.49	7.60
-25	305.3	434.8	629.1	-5.28	6.79
-20	235.6	335.6	485.5	-5.09	6.01
-15	183.5	261.4	378.2	-4.90	5.25
-10	144.3	205.5	297.3	-4.73	4.51
-5	114.3	162.8	235.6	-4.57	3.80
0	91.34	130.1	188.2	-4.42	3.11
5	73.51	104.7	151.5	-4.27	2.45
10	59.59	84.87	122.8	-4.13	1.80
15	48.63	69.26	100.2	-4.00	1.18
20	39.94	56.88	82.29	-3.88	0.58
25	33.00	47.00	68.00	-3.76	0.00
30	27.43	39.06	56.51	-3.64	0.56
35	22.92	32.64	47.23	-3.54	1.11
40	19.26	27.42	39.68	-3.43	1.63
45	16.26	23.16	33.50	-3.34	2.14
50	13.79	19.65	28.42	-3.24	2.63
55	11.76	16.74	24.23	-3.15	3.11
60	10.06	14.33	20.74	-3.07	3.57
65	8.652	12.32	17.83	-2.98	4.02
70	7.468	10.64	15.39	-2.90	4.45
75	6.471	9.216	13.33	-2.83	4.87
80	5.628	8.015	11.60	-2.76	5.27
85	4.912	6.996	10.12	-2.69	5.66
90	4.302	6.127	8.865	-2.62	6.04
95	3.780	5.384	7.790	-2.55	6.41
100	3.332	4.746	6.867	-2.49	6.77
105	2.946	4.196	6.071	-2.43	7.11
110	2.613	3.721	5.384	-2.37	7.45
115	2.324	3.310	4.788	-2.32	7.77
120	2.072	2.951	4.270	-2.26	8.09
125	1.853	2.639	3.818	-2.21	8.39
130	1.661	2.365	3.422	-2.16	8.69
135	1.492	2.125	3.075	-2.11	8.97
140	1.344	1.914	2.770	-2.07	9.25
145	1.213	1.728	2.500	-2.02	9.52
150	1.098	1.564	2.262	-1.98	9.79

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (100, 150, 220, 330, 470, 680) Ω

T_{OPER} (°C)	PART NUMBER NTCLE100E3101***	PART NUMBER NTCLE100E3151***	PART NUMBER NTCLE100E3221***	PART NUMBER NTCLE100E3331***	PART NUMBER NTCLE100E3471***	PART NUMBER NTCLE100E3681***	TCR (%/K)	Δ*R*/*R* DUE TO $B_{tol.}$ (%)
	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)		
-40	2193	3289	4824	7236	10 305	14 910	-5.75	4.99
-35	1652	2478	3635	5452	7766	11 235	-5.57	4.51
-30	1256	1884	2763	4144	5902	8540	-5.40	4.05
-25	962.5	1444	2117	3176	4524	6545	-5.24	3.61
-20	743.6	1115	1636	2454	3495	5057	-5.08	3.19
-15	579.0	868.5	1274	1911	2721	3937	-4.93	2.78
-10	454.2	681.2	999.1	1499	2135	3088	-4.78	2.38
-5	358.8	538.2	789.4	1184	1686	2440	-4.64	2.01
0	285.4	428.2	628.0	942.0	1342	1941	-4.51	1.64
5	228.6	342.9	502.9	754.4	1074	1554	-4.38	1.29
10	184.2	276.4	405.3	608.0	866.0	1253	-4.25	0.95
15	149.4	224.1	328.7	493.1	702.2	1016	-4.13	0.62
20	121.9	182.8	268.2	402.2	572.9	828.8	-4.01	0.31
25	100.0	150.0	220.0	330.0	470.0	680.0	-3.90	0.00
30	82.49	123.7	181.5	272.2	387.7	561.0	-3.80	0.30
35	68.41	102.6	150.5	225.8	321.5	465.2	-3.69	0.58
40	57.02	85.54	125.5	188.2	268.0	387.8	-3.59	0.86
45	47.77	71.65	105.1	157.6	224.5	324.8	-3.50	1.13
50	40.20	60.30	88.44	132.7	188.9	273.3	-3.40	1.39
55	33.98	50.98	74.76	112.1	159.7	231.1	-3.31	1.64
60	28.86	43.28	63.48	95.23	135.6	196.2	-3.23	1.88
65	24.61	36.91	54.13	81.20	115.6	167.3	-3.15	2.12
70	21.07	31.60	46.35	69.52	99.01	143.3	-3.07	2.35
75	18.11	27.16	39.84	59.76	85.11	123.1	-2.99	2.57
80	15.62	23.43	34.37	51.56	73.43	106.2	-2.91	2.79
85	13.53	20.29	29.76	44.65	63.59	92.00	-2.84	3.00
90	11.76	17.63	25.86	38.80	55.26	79.95	-2.77	3.21
95	10.25	15.38	22.55	33.83	48.18	69.71	-2.71	3.41
100	8.968	13.45	19.73	29.59	42.15	60.98	-2.64	3.60
105	7.871	11.81	17.32	25.97	36.99	53.52	-2.58	3.79
110	6.928	10.39	15.24	22.86	32.56	47.11	-2.52	3.97
115	6.117	9.176	13.46	20.19	28.75	41.60	-2.46	4.15
120	5.416	8.125	11.92	17.87	25.46	36.83	-2.41	4.33
125	4.809	7.214	10.58	15.87	22.60	32.70	-2.35	4.50
130	4.282	6.422	9.419	14.13	20.12	29.11	-2.30	4.66
135	3.822	5.732	8.408	12.61	17.96	25.99	-2.25	4.83
140	3.420	5.130	7.523	11.29	16.07	23.25	-2.20	4.99
145	3.068	4.601	6.749	10.12	14.42	20.86	-2.15	5.14
150	2.758	4.137	6.068	9.102	12.96	18.76	-2.10	5.29

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (1, 1.5, 2) kΩ					
T_{OPER} (°C)	PART NUMBER NTCLE100E3102***	PART NUMBER NTCLE100E3152***	PART NUMBER NTCLE100E3202***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
	R_T (Ω)	R_T (Ω)	R_T (Ω)		
-40	23 342	35 013	46 684	-6.06	1.65
-35	17 336	26 004	34 672	-5.84	1.49
-30	13 018	19 526	26 035	-5.62	1.34
-25	9877	14 816	19 754	-5.42	1.19
-20	7569	11 353	15 138	-5.23	1.05
-15	5855	8782	11 709	-5.05	0.92
-10	4569	6854	9138	-4.87	0.79
-5	3596	5395	7193	-4.71	0.66
0	2854	4280	5707	-4.55	0.54
5	2282	3422	4563	-4.40	0.43
10	1838	2757	3675	-4.26	0.31
15	1491	2236	2981	-4.12	0.21
20	1217	1826	2434	-3.99	0.10
25	1000	1500	2000	-3.87	0.00
30	826.6	1240	1653	-3.75	0.10
35	687.3	1031	1375	-3.63	0.19
40	574.6	861.9	1149	-3.53	0.28
45	482.7	724.0	965.4	-3.42	0.37
50	407.4	611.0	814.7	-3.32	0.46
55	345.2	517.8	690.5	-3.23	0.54
60	293.7	440.6	587.4	-3.14	0.62
65	250.8	376.2	501.6	-3.05	0.70
70	214.9	322.4	429.8	-2.97	0.78
75	184.7	277.1	369.5	-2.89	0.86
80	159.3	238.9	318.6	-2.81	0.93
85	137.7	206.6	275.5	-2.73	1.01
90	119.4	179.1	238.8	-2.66	1.08
95	103.8	155.7	207.6	-2.59	1.15
100	90.45	135.7	180.9	-2.53	1.22
105	79.00	118.5	158.0	-2.46	1.29
110	69.15	103.7	138.3	-2.40	1.35
115	60.66	90.99	121.3	-2.34	1.42
120	53.32	79.98	106.6	-2.29	1.48
125	46.96	70.44	93.92	-2.23	1.55
130	41.43	62.15	82.87	-2.18	1.61
135	36.63	54.94	73.25	-2.13	1.67
140	32.43	48.65	64.87	-2.08	1.73
145	28.77	43.16	57.54	-2.03	1.79
150	25.56	38.34	51.12	-1.98	1.85

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (2.2, 2.7, 3.3, 4.7, 5.0, 6.8, 10) kΩ									
T_{OPER} (°C)	PART NUMBER NTCLE100E3222***	PART NUMBER NTCLE100E3272***	PART NUMBER NTCLE100E3332***	PART NUMBER NTCLE100E3472***	PART NUMBER NTCLE100E3502***	PART NUMBER NTCLE100E3682***	PART NUMBER NTCLE100E3103***	TCR (%/K)	Δ*R*/*R* DUE TO $B_{tol.}$ (%)
	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)	R_T (Ω)		
-40	73 061	89 665	109 591	156 084	166 047	225 824	332 094	-6.62	2.79
-35	52 778	64 773	79 167	112 753	119 950	163 132	239 900	-6.39	2.52
-30	38 544	47 304	57 816	82 344	87 600	119 136	175 200	-6.18	2.26
-25	28 443	34 907	42 665	60 765	64 643	87 915	129 287	-5.98	2.02
-20	21 199	26 017	31 798	45 288	48 179	65 524	96 358	-5.78	1.78
-15	15 950	19 575	23 925	34 075	36 250	49 300	72 500	-5.60	1.55
-10	12 110	14 862	18 165	25 872	27 523	37 431	55 046	-5.42	1.33
-5	9275	11 382	13 912	19 814	21 078	28 667	42 157	-5.25	1.12
0	7162	8790	10 743	15 300	16 277	22 137	32 554	-5.09	0.92
5	5574	6841	8362	11 909	12 669	17 230	25 339	-4.93	0.72
10	4372	5365	6558	9340	9936	13 513	19 872	-4.79	0.53
15	3454	4239	5180	7378	7849	10 675	15 698	-4.64	0.35
20	2747	3372	4121	5869	6244	8492	12 488	-4.51	0.17
25	2200	2700	3300	4700	5000	6800	10 000	-4.38	0.00
30	1773	2176	2659	3788	4030	5480	8059	-4.25	0.17
35	1438	1764	2156	3071	3267	4444	6535	-4.13	0.32
40	1173	1439	1759	2505	2665	3624	5330	-4.02	0.48
45	961.8	1180	1443	2055	2186	2973	4372	-3.91	0.63
50	793.2	973.4	1190	1694	1803	2452	3605	-3.80	0.77
55	657.5	806.9	986.3	1405	1494	2032	2989	-3.70	0.91
60	547.8	672.3	821.7	1170	1245	1693	2490	-3.60	1.05
65	458.6	562.8	687.9	979.7	1042	1417	2084	-3.51	1.18
70	385.7	473.3	578.5	823.9	876.5	1192	1753	-3.42	1.31
75	325.8	399.8	488.7	696.0	740.5	1007	1481	-3.33	1.44
80	276.4	339.2	414.6	590.5	628.2	854.3	1256	-3.25	1.56
85	235.5	289.0	353.2	503.0	535.2	727.8	1070	-3.17	1.68
90	201.4	247.2	302.1	430.2	457.7	622.5	915.4	-3.09	1.79
95	172.9	212.2	259.4	369.4	393.0	534.5	786.0	-3.01	1.90
100	149.0	182.9	223.5	318.3	338.6	460.6	677.3	-2.94	2.01
105	128.9	158.2	193.3	275.3	292.9	398.3	585.7	-2.87	2.12
110	111.8	137.2	167.7	238.9	254.2	345.7	508.3	-2.80	2.22
115	97.37	119.5	146.1	208.0	221.3	301.0	442.6	-2.74	2.32
120	85.05	104.4	127.6	181.7	193.3	262.9	386.6	-2.67	2.42
125	74.52	91.46	111.8	159.2	169.4	230.3	338.7	-2.61	2.51
130	65.49	80.38	98.24	139.9	148.8	202.4	297.7	-2.55	2.61
135	57.72	70.84	86.59	123.3	131.2	178.4	262.4	-2.50	2.70
140	51.02	62.62	76.53	109.0	116.0	157.7	231.9	-2.44	2.78
145	45.22	55.49	67.83	96.60	102.8	139.8	205.5	-2.39	2.87
150	40.18	49.31	60.27	85.84	91.32	124.2	182.6	-2.34	2.96

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (12, 15, 22) kΩ					
T_{OPER} (°C)	PART NUMBER NTCLE100E3123***	PART NUMBER NTCLE100E3153***	PART NUMBER NTCLE100E3223***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
	R_T (kΩ)	R_T (kΩ)	R_T (kΩ)		
-40	309.4	386.7	567.2	-6.07	7.00
-35	229.5	286.9	420.8	-5.88	6.32
-30	171.8	214.8	315.0	-5.70	5.68
-25	129.8	162.3	238.0	-5.52	5.06
-20	98.93	123.7	181.4	-5.35	4.46
-15	76.02	95.02	139.4	-5.19	3.89
-10	58.88	73.60	107.9	-5.03	3.34
-5	45.95	57.44	84.25	-4.88	2.81
0	36.13	45.16	66.24	-4.74	2.30
5	28.61	35.76	52.45	-4.60	1.80
10	22.80	28.51	41.81	-4.47	1.33
15	18.30	22.87	33.55	-4.34	0.87
20	14.77	18.47	27.08	-4.22	0.43
25	12.00	15.00	22.00	-4.10	0.00
30	9.804	12.25	17.97	-3.99	0.41
35	8.054	10.07	14.77	-3.88	0.81
40	6.652	8.315	12.20	-3.77	1.20
45	5.522	6.903	10.12	-3.67	1.58
50	4.607	5.759	8.447	-3.58	1.94
55	3.862	4.828	7.081	-3.48	2.29
60	3.252	4.066	5.963	-3.39	2.64
65	2.751	3.439	5.044	-3.30	2.97
70	2.337	2.921	4.284	-3.22	3.29
75	1.993	2.492	3.654	-3.14	3.60
80	1.707	2.134	3.129	-3.06	3.91
85	1.467	1.834	2.690	-2.99	4.20
90	1.266	1.582	2.321	-2.92	4.49
95	1.096	1.370	2.010	-2.85	4.77
100	0.9524	1.190	1.746	-2.78	5.04
105	0.8302	1.038	1.522	-2.71	5.31
110	0.7260	0.9075	1.331	-2.65	5.56
115	0.6369	0.7961	1.168	-2.59	5.82
120	0.5604	0.7005	1.027	-2.53	6.06
125	0.4945	0.6181	0.9065	-2.47	6.30
130	0.4375	0.5469	0.8022	-2.42	6.53
135	0.3882	0.4853	0.7117	-2.37	6.76
140	0.3454	0.4317	0.6332	-2.31	6.98
145	0.3080	0.3850	0.5647	-2.26	7.20
150	0.2754	0.3442	0.5049	-2.22	7.41

For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (33, 47, 50, 68, 100) kΩ									
T_{OPER} (°C)	PART NUMBER NTCLE100E3								
	333***	473***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)	503***	683***	104***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
	R_T (kΩ)	R_T (kΩ)			R_T (kΩ)	R_T (kΩ)	R_T (kΩ)		
-40	1116	1589	-6.54	5.74	1833	2493	3666	-6.69	5.88
-35	808.6	1152	-6.34	5.19	1319	1794	2638	-6.49	5.31
-30	591.7	842.8	-6.15	4.66	958.3	1303	1917	-6.29	4.77
-25	437.1	622.6	-5.96	4.15	703.1	956.2	1406	-6.10	4.25
-20	325.9	464.1	-5.79	3.66	520.6	708.0	1041	-5.92	3.75
-15	245.0	349.0	-5.62	3.19	388.9	528.9	777.8	-5.75	3.27
-10	185.8	264.6	-5.45	2.74	293.0	398.5	586.1	-5.58	2.80
-5	142.0	202.3	-5.30	2.30	222.6	302.8	445.3	-5.42	2.36
0	109.4	155.8	-5.14	1.88	170.5	231.8	340.9	-5.26	1.93
5	84.91	120.9	-5.00	1.48	131.5	178.9	263.1	-5.11	1.52
10	66.37	94.53	-4.86	1.09	102.2	139.0	204.4	-4.97	1.12
15	52.24	74.40	-4.72	0.71	80.01	108.8	160.0	-4.83	0.73
20	41.39	58.95	-4.59	0.35	63.04	85.74	126.1	-4.70	0.36
25	33.00	47.00	-4.47	0.00	50.00	68.00	100.0	-4.57	0.00
30	26.47	37.71	-4.35	0.34	39.90	54.27	79.81	-4.45	0.35
35	21.37	30.43	-4.23	0.67	32.04	43.57	64.08	-4.33	0.68
40	17.34	24.70	-4.12	0.99	25.87	35.19	51.75	-4.22	1.01
45	14.15	20.15	-4.01	1.29	21.01	28.57	42.02	-4.11	1.33
50	11.61	16.53	-3.91	1.59	17.15	23.33	34.31	-4.00	1.63
55	9.572	13.63	-3.81	1.88	14.08	19.15	28.16	-3.90	1.93
60	7.931	11.30	-3.71	2.16	11.61	15.79	23.22	-3.80	2.21
65	6.603	9.404	-3.62	2.43	9.623	13.09	19.25	-3.71	2.49
70	5.522	7.865	-3.53	2.70	8.012	10.90	16.02	-3.62	2.76
75	4.639	6.607	-3.44	2.95	6.701	9.114	13.40	-3.53	3.03
80	3.913	5.573	-3.36	3.20	5.629	7.655	11.26	-3.45	3.28
85	3.315	4.721	-3.28	3.45	4.748	6.457	9.496	-3.36	3.53
90	2.819	4.015	-3.20	3.68	4.021	5.469	8.042	-3.28	3.77
95	2.406	3.427	-3.13	3.91	3.419	4.649	6.837	-3.21	4.01
100	2.062	2.936	-3.05	4.13	2.918	3.968	5.835	-3.13	4.24
105	1.773	2.525	-2.98	4.35	2.499	3.399	4.998	-3.06	4.46
110	1.530	2.179	-2.92	4.56	2.148	2.921	4.296	-2.99	4.68
115	1.324	1.886	-2.85	4.77	1.853	2.519	3.705	-2.93	4.89
120	1.150	1.638	-2.79	4.97	1.603	2.180	3.206	-2.86	5.09
125	1.002	1.427	-2.73	5.17	1.392	1.892	2.783	-2.80	5.29
130	0.8757	1.247	-2.67	5.36	1.212	1.648	2.423	-2.74	5.49
135	0.7675	1.093	-2.61	5.54	1.058	1.439	2.116	-2.68	5.68
140	0.6746	0.9608	-2.55	5.73	0.9269	1.261	1.854	-2.62	5.87
145	0.5946	0.8468	-2.50	5.90	0.8141	1.107	1.628	-2.57	6.05
150	0.5254	0.7483	-2.45	6.08	0.7170	0.9752	1.434	-2.51	6.23

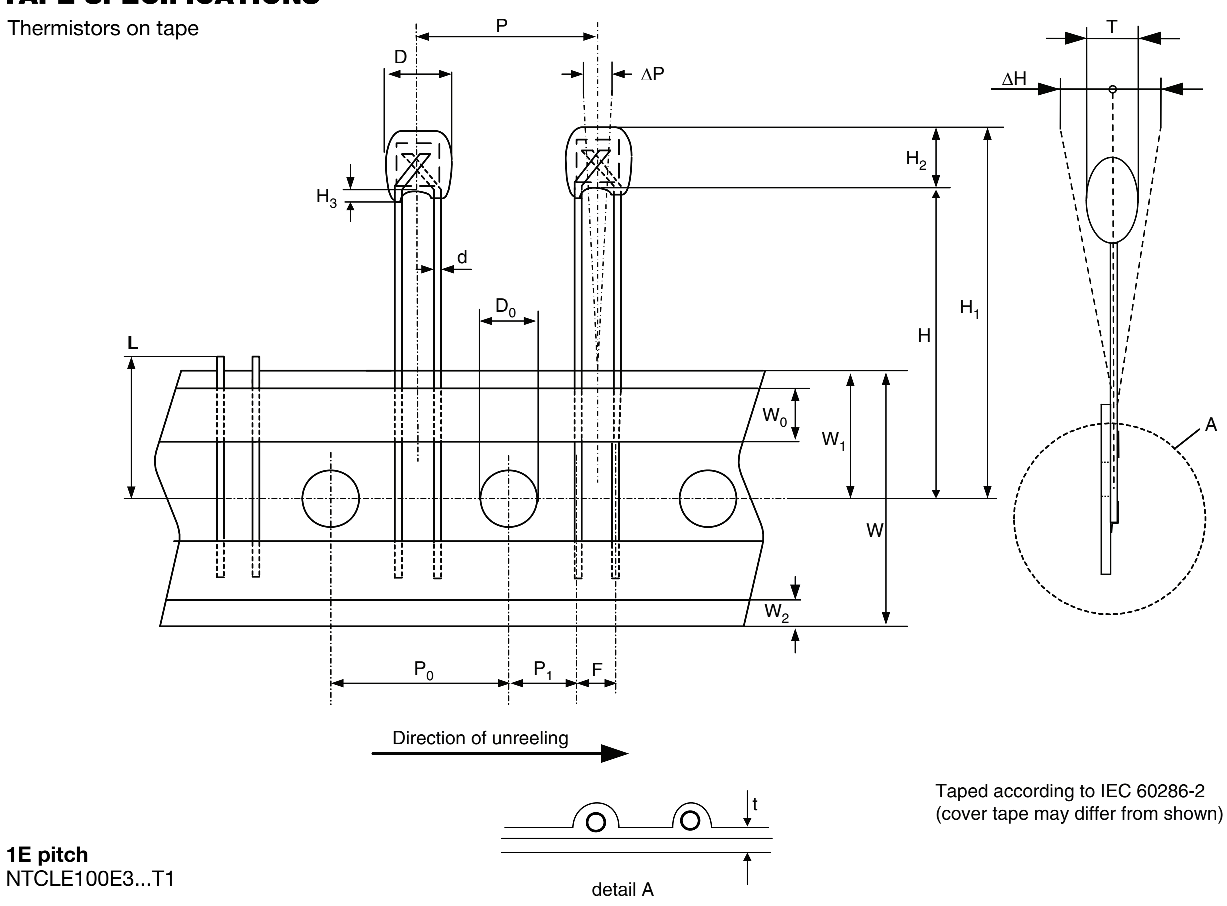
For complete Curve Computation, visit: www.vishay.com/thermistors/ntc-curve-list/

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R_{25} AT (150, 220, 330, 470) kΩ								
T_{OPER} (°C)	PART NUMBER NTCLE100E3							
	154***	224***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)	334***	474***	TCR (%/K)	ΔR/R DUE TO $B_{tol.}$ (%)
	R_T (kΩ)	R_T (kΩ)			R_T (kΩ)	R_T (kΩ)		
-40	6153	9024	-6.83	10.22	16 044	22 850	-7.14	6.41
-35	4394	6444	-6.64	9.24	11 282	16 068	-6.94	5.80
-30	3168	4646	-6.45	8.29	8013	11 413	-6.74	5.20
-25	2305	3381	-6.27	7.39	5747	8185	-6.55	4.64
-20	1693	2483	-6.09	6.52	4161	5926	-6.37	4.09
-15	1254	1839	-5.92	5.68	3040	4329	-6.19	3.57
-10	936.4	1373	-5.75	4.88	2240	3190	-6.02	3.06
-5	705.0	1034	-5.60	4.10	1665	2371	-5.85	2.57
0	535.0	784.7	-5.44	3.36	1248	1777	-5.69	2.11
5	409.1	600.0	-5.29	2.64	942.3	1342	-5.54	1.65
10	315.1	462.1	-5.15	1.94	717.1	1021	-5.39	1.22
15	244.4	358.4	-5.01	1.27	549.8	783.0	-5.24	0.80
20	190.8	279.9	-4.88	0.63	424.5	604.6	-5.10	0.39
25	150.0	220.0	-4.75	0.00	330.0	470.0	-4.97	0.00
30	118.6	174.0	-4.63	0.60	258.2	367.8	-4.84	0.38
35	94.42	138.5	-4.51	1.19	203.4	289.6	-4.72	0.75
40	75.58	110.9	-4.39	1.76	161.1	229.5	-4.59	1.10
45	60.85	89.24	-4.28	2.30	128.4	182.9	-4.48	1.45
50	49.25	72.24	-4.17	2.83	103.0	146.7	-4.37	1.78
55	40.08	58.78	-4.07	3.35	83.00	118.2	-4.26	2.10
60	32.78	48.08	-3.97	3.85	67.26	95.80	-4.15	2.41
65	26.94	39.51	-3.87	4.33	54.79	78.04	-4.05	2.72
70	22.25	32.63	-3.78	4.80	44.85	63.88	-3.95	3.01
75	18.46	27.07	-3.69	5.26	36.90	52.55	-3.86	3.30
80	15.38	22.56	-3.60	5.70	30.49	43.43	-3.77	3.58
85	12.87	18.88	-3.52	6.14	25.31	36.05	-3.68	3.85
90	10.82	15.87	-3.44	6.56	21.10	30.06	-3.59	4.11
95	9.129	13.39	-3.36	6.96	17.67	25.16	-3.51	4.37
100	7.732	11.34	-3.28	7.36	14.85	21.15	-3.43	4.62
105	6.574	9.642	-3.21	7.75	12.53	17.85	-3.35	4.86
110	5.610	8.228	-3.14	8.13	10.62	15.12	-3.28	5.10
115	4.804	7.046	-3.07	8.49	9.029	12.86	-3.21	5.33
120	4.128	6.054	-3.00	8.85	7.704	10.97	-3.14	5.55
125	3.559	5.219	-2.94	9.20	6.597	9.396	-3.07	5.77
130	3.078	4.514	-2.87	9.54	5.668	8.072	-3.00	5.99
135	2.670	3.916	-2.81	9.87	4.885	6.958	-2.94	6.20
140	2.323	3.408	-2.75	10.20	4.224	6.016	-2.88	6.40
145	2.028	2.974	-2.69	10.52	3.663	5.217	-2.82	6.60
150	1.774	2.603	-2.64	10.83	3.186	4.538	-2.76	6.79

PACKAGING

TAPE SPECIFICATIONS

Thermistors on tape

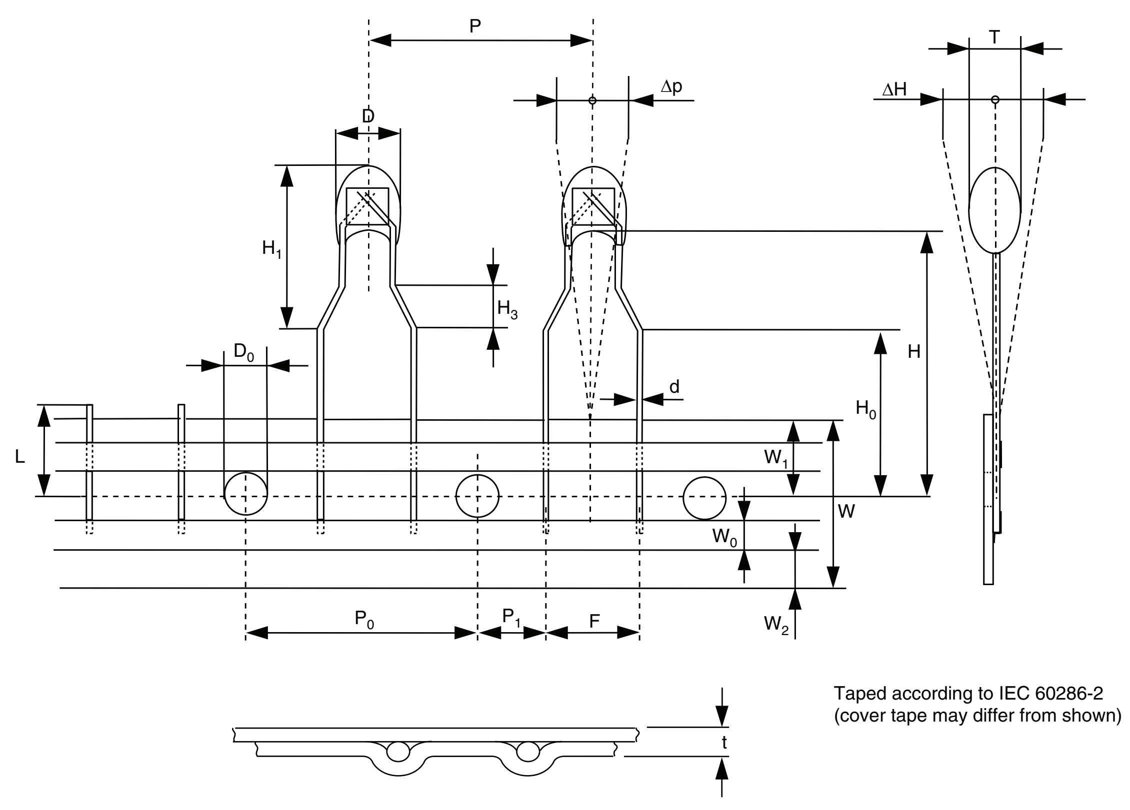


Taped according to IEC 60286-2
(cover tape may differ from shown)

1E pitch
NTCLE100E3...T1

DIMENSIONS in millimeters				
DETAILS	**SYMBOL**	**DIMENSIONS NOMINAL**	**TOLERANCE**	**REMARKS**
Body diameter Lead diameter Feed hole diameter	D d D_0	3.3 0.6 4.0	± 0.5 ± 0.06 ± 0.2	5 max. for 3.3 Ω to 220 Ω
Lead to lead distance	F	2.5	+0.5 -0.2	Guaranteed between component and tape
Distance component to tape centre Component height Component alignment Distance top/bottom of components Length of lacquer under the comp. bottom	H H_1 Δh H_2 H_3	22.0 32.2 0 6 2	± 1.0 max. ± 2.0 max. ± 1	1 to 4 max. for 3.3 Ω to 220 Ω
Length of snipped lead	L	11.0	max.	
Pitch between thermistors Feed hole pitch Feed hole center to lead center Component alignment	P P_0 P_1 Δp	12.7 12.7 5.08 0	± 1.0 ± 0.3 ± 0.7 ± 1.3	Cumulative pitch error ± 1 mm/20 pitches guaranteed between component and tape
Total thickness Total tape thickness	T t	3.0 0.9	max. max.	4 max. for 3.3 Ω to 220 Ω with cardboard tape 0.5 ± 0.1
Tape width Hold down tape width Hole position Hold down tape position	W W_0 W_1 W_2	18.0 5.0 9.0 1.5	± 1.0 - 0.5 ± 0.3 ± 0.5 ± 1.0	None of the hold down tapes may cover the holes

Thermistors on tape



Taped according to IEC 60286-2
(cover tape may differ from shown)

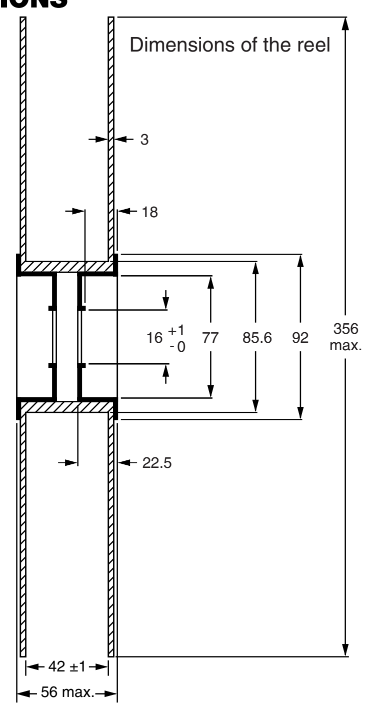
2E pitch

NTCLE100E3...T2

DIMENSIONS in millimeters

DETAILS	SYMBOL	DIMENSIONS NOMINAL	TOLERANCE	REMARKS
Body diameter Lead diameter Feed hole diameter	D d D_0	3.3 0.6 4.0	± 0.5 ± 0.06 ± 0.2	5 max. for 3.3 Ω to 220 Ω
Lead to lead distance	F	5.0	+0.5 -0.2	Guaranteed between component and tape
Distance component to tape centre Component height Component alignment Distance top/bottom of components Length of lacquer under the comp. bottom	H H_0 H_1 Δh H_3	20.0 16.0 10.0 0.0	± 2.0 ± 0.5 max. ± 2.0	12 max. for 100 Ω to 220 Ω Not defined
Length of snipped lead	L	11.0	max.	
Pitch between thermistors Feed hole pitch Feed hole center to lead center Component alignment	P P_0 P_1 Δp	12.7 12.7 3.81 0.0	± 1.0 ± 0.3 ± 0.7 ± 1.3	Cumulative pitch error ± 1 mm/20 pitches guaranteed between component and tape
Total thickness Total tape thickness	T t	3.0 0.9	max. max.	4 max. for 3.3 Ω to 220 Ω with cardboard tape 0.5 ± 0.1
Tape width Hold down tape width Hole position Hold down tape position	W W_0 W_1 W_2	18.0 5.0 9.0 1.5	± 1.0 - 0.5 ± 0.3 ± 0.5 ± 1.0	None of the hold down tapes may cover the holes

REEL SPECIFICATIONS



PART NUMBERS AND PACKAGING		
PACKING METHOD	**PART NUMBERS**	**QUANTITY**
Bulk	**NTCLE100E3....B0(A)**	500
Tape and reel 1E pitch	**NTCLE100E3....T1(A)**	1500 per reel, 2 reels per box
Tape and reel 2E pitch	**NTCLE100E3....T2(A)**	1500 per reel, 2 reels per box

CHARACTERISTICS OF TAPED PRODUCTS

Minimum pull-out force of the component: 5 N

Minimum peel-off force of adhesive tape: 6 N

Minimum tearing force tape: 15 N

Minimum pull-off force of tape-reel: 5 N

STORAGE CONDITIONS

Storage temperature range: - 25 °C to + 40 °C

Maximum relative humidity: 80 %, non-condensing

TESTS AND REQUIREMENTS

Tests are carried out in accordance with IEC 60068-2 and IEC 60539-1.

STABILITY TESTS			
IEC 60068-2 TEST METHOD	**TEST**	**PROCEDURE**	**REQUIREMENTS**
	Endurance	25 °C; 1000 h	$\Delta R/R < 1$ %
1	Endurance	-40 °C; 1000 h	$\Delta R/R < 1$ %
60539 (5.25.4)	Endurance	500 mW; 55 °C; 1000 h	$\Delta R/R < 3$ % (1)
2	Dry heat, (steady state)	125 °C; 1000 h	$\Delta R/R < 3$ %
78	Damp heat (steady state)	56 days at 40 °C; 90 % to 95 % RH	$\Delta R/R < 3$ %
14	Rapid change of temperature	-40 °C to +125 °C; 50 cycles	$\Delta R/R < 2$ %
Other applicable tests			
21	Robustness of leads: Tensile strength Bending	Loading force 10 N Loading force 5 N	$\Delta R/R \leq 1$ %
58	Soldering: Solderability Resistance to heat	240 °C max.; duration 4 s max. 265 °C max.; duration 5 s max.	$\Delta R/R \leq 1$ % (2)
27	Impact	Free fall; 1 m	$\Delta R/R \leq 1$ %
29	Shock	490 m/s; half sinewave	$\Delta R/R \leq 1$ %
45	Resistance to solvent (isopropanol)	Ambient temp for 5 minutes; 5 N with hydrophilic cotton wool	No traces of lacquer on cotton wool
6	Vibration	1.5 mm peak to peak: 10 Hz to 58 Hz 10 gp: 50 Hz to 500 Hz 1 octave/min. 2 h in each direction in three orthogonal directions	No visible damage $\Delta R/R < 1$ %
60695-2-2	Inflammability	1980, needle flame test	Non-flammable

Notes

(1) For $R_{25} \geq 100$ kΩ the drift requirement is $\Delta R/R < 5$ %

(2) For R_{25} from 2.2 kΩ to 10 kΩ, requirement is ± 2 % max.

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